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CONCERNING COLOR THEORIES AND THE GENERAL HARMONY OF COLOR.

BY GEORGE CURTIS WRIGHT.

THE theory of Thomas Young, as elaborated and promulgated by Professor Helmholtz, through whose reasoning and experiments it was raised to the dignity and assurance it now assumes, has, until quite recently, been the one most relied upon in explanation of colored vision. It is yet to be proved that it is anything more than a pure hypothesis, since not one of its fundamental principles is a demonstrated or demonstrable fact.

Professor Young's vivid imagination seizes upon the hypothesis which seemed to satisfy the demands of an acceptable theory, as it appeared to account for nearly all of the observed phenomena. When Helmholtz revived and resurrected this theory, the question of color blindness had not been investigated to the extent it has within the past ten years, and most physicists rested content, believing the true theory of colors had been discovered at last.

Undoubtedly the true theory of vision is one of the questions to be solved by the coming physiologist. It seems very simple and plausible in considering the Young-Helmholtz theory, demanding as it does three primary or fundamental colors (by the admixture of which all other colors are produced), but certain phenomena of vision renders it necessary to modify this simplicity, and practically mar its symmetry, giving it an elasticity which is not agreeable to the student of exact science. The phenomena of color blindness is explained in keeping with this theory, but in not altogether a plausible manner. In accordance with this theory, there can be no color-blindness in the true acceptance of the term except when all color fibres are lacking, because all colors produce an impression of some kind, though it may not be the one experienced in those of normal color perception. There is, moreover, a marked confusion of the various colors, and by the special character of this confusion one kind of color-blindness is differential from another. It is made quite plain by deductive reasoning and experiments on the color blind (upon whom much depends in color research) that the evidences are against the three fibre theory of Young-Helmholtz, inasmuch that the red-blind can not distinguish perfectly the greens and violets, nor the green-blind the reds and violets, yellow and blue being the only colors about which they make no mistake. Even in a spectrum, which is very much shortened, the red-blind finds the brightest place, not in the bluish-green, as we would expect, but in the yellow, as in the normal eye. This theory does not explain satisfactorily the extreme shortening of the spectrum entering, as it sometimes does, into orange, and even into yellow. The line of demarcation in the spectrum is sharply at the blue, all to the left almost always appearing of one color, and all to the right of another, there being no lines of division between blue and violet, nor between the red and yellow and the yellow and green. The gray or neutral band is far from being invariably present, and when it is it is often, in the red-blind, in the position it should be in the green-blind. There is another theory of colors brought forward within the last few years by Professor Hering, of Prague, which is sustained by many physiologists, and is a vigorous rival of the Young-Helmholtz theory. It is quite different from that of Young, and assumes that the retina is provided with three visual substances, and the fundamental sensations are not three, but six, which are called the black-white, the red-green, and the blue-yellow. Light acts upon these substances by what Hering terms assimilation (A) and dissimilation (D), thus red light acts on the red-green substance in exactly the opposite way from green light, and when both kinds of light are present in suitable proportions a balance is effected, and both sensations, red and green, vanish. Hering is not certain which are the A and which the D colors, but he is disposed to regard red as the dissimilating color of the red-green substance, and green the assimilating color. Blue, he thinks, causes dissimilation of the blue-yellow substance, while its regeneration is caused by yellow. All colors, he supposes, act in a dissimilating manner on the black-white substance—that is, they produce the sensation of white in addition to their own peculiar color. In accordance with this theory there are, therefore, four fundamental colors instead of three (excluding black and white), namely, red, green, yellow and blue, and they are supposed to be produced in the following manner: Red is the product of dissimilation of the red-green substance, green is the result of its assimilation; blue is the result of the dissimilation of the blue-

yellow, and yellow of its assimilation. When the A and D action on the red-green and blue-yellow substance are equal, there is no color sensation, but only a D action of these colors on the black-white substance, which is white. Simultaneous A and D action on the black-white substance, however, is not attended by abolition of sensation, but by the sensation of gray. In the Hering theory, what were formerly considered as complementary colors are antagonistic, and tend to neutralize each other. Those colors have been called complementary (when considering the colored rays of the spectrum) which when mixed together, would produce white light. This was accounted for by the Young-Helmholtz theory on the principle of subtraction. From the foregoing, it is evident that neither of the two theories satisfactorily accounts for all the phenomena of color sensations.



COLUMN IN ENTRANCE COURT OF THE PALAZZO VECCHIO, FLORENCE.

FROM ART AND LETTERS, LONDON.

When the true theory of colors is found, it will undoubtedly be very simple, and the laws governing the sense of vision may bear some analogy to those controlling the other senses; possibly in the direction pointed out by the recent researches on the physical reaction of certain simple substances to the undulations of the luminiferous ether. This reaction may be chemical, purely physical, or chemico-physical. The changes in the molecular structure of simple substances, caused by the action of ether or the variation in the sensation produced will have its basis, not in the complexity of tissue, but in the varying action of the affecting agent. The acceptance of such an hypothesis does not necessarily involve the invention of new laws, or of creating new issues; it simply applies known laws and analogous reactions of other substances to the explanation of the phenomena observed.

These are membranes which respond with promptness to any number of simple aerial vibrations at the same time, recent discoveries proving that when certain substances are in proper condition they respond to wave-lengths of light.

When in a crystalline condition, silicium alters its molecular construction (as manifested by its varying resistance to the passage of the electric current) not only when acted on by light of varying intensity, but also by different wave-lengths.

Suppose the retina to be a substance of this nature, but responding more promptly, and in a more delicate manner than any other known substance to the wave-lengths of light, we have the keystone of another theory of vision extremely simple, and based on known physical laws.

The changes produced by these wave-lengths of light upon the molecular structure of the retina would be transmitted by the optic nerve to the centre of vision in the brain, and there converted into a sensation.

The difference in the various theories of color lies in the supposed reaction of the retina to light. After the impression has passed beyond this line, there is no special difference in the views as to the final conversion into a sensation.

It is safe to assume, with our knowledge of analogous matters, that the perfect discernment of colors is a power partly inherited and partly developed in the individual, we should, therefore, expect to find this power, which is undoubtedly cerebral in its character, most strongly developed where the faculty was most used. Women, who are much more concerned than men in the selection and comparison of colors, are rarely affected with color blindness. The feminine eye is much quicker in detecting slight differences in shades of color than is that of men. It may be a question of years ere the true solution of color sensations is definitely determined. However, with our present knowledge, an apparently plausible combination is effected in the harmonious use of color based on the Young-Helmholtz theory. It certainly overthrows all the reasonings of those who sustain Brewster's theory of there being only *three fundamental kinds* of light, red, yellow, and blue (though it is the one believed in by most artists). As previously mentioned, the study of color blindness has furnished evidence in favor of the choice of Young, and its phenomena seem explicable by it.

THE PALAZZO VECCHIO, FLORENCE.

To one familiar with the history of Florence, a study of the court of this Palace must be of interest, for it was the scene of some of the most thrilling events connected with that Republic. Built by Arnolfo del Cambio, the architect of the Church of Santa Croce, it served for years as the residence of the chief magistrates of the city during their exceedingly brief term of office of two months. When the Republic was declared at an end the Palace was occupied by Cosimo I., and since that time it has been devoted to the business purposes of the government.

The building in its architecture is massive and stately, beauty has been sacrificed to the strength, and it gives one the impression more of a fortress or a prison than the dwelling of a king. The interior however fully compensates for the almost forbidding aspect of the outer walls. The court, of which we give an illustration together with a column enlarged in detail all from our contemporary *Art and Letters*, constituted the approach to the inner apartments, and is adorned with frescos, many of them badly faded, representing scenes in German cities, and on the columns the most elaborate and richest patterns of the Renaissance. In the centre of this court is a fountain of a boy and dolphin designed by Andrea del Verocchio for Lorenzo de Medici.

At the head of the grand stairway, is the Great Saloon, or the Sala del Cinquecento, the most interesting place in the building, and in size seventy-five feet by one hundred and seventy. The ceiling is most gorgeously decorated in the floriated and grotesque styles, in the most vivid and exciting colors, the walls have remnants of a fresco by Michel Angelo, representing the soldiers of Florence surprised by the enemy whilst bathing; and the unfortunate evidences of a fresco by Leonardo de Vinci, which, owing to the poverty of the materials used, crumbled away until nothing but a suspicion of it is left. The remaining frescos, of which there are many, are almost entirely historical incidents, and by Nasari, Ligozzi, Cigoli and Passignano. The interest attached to this room is almost entirely of a historical character, and recalls the addresses made here by Savonarola and Victor Emmanuel.

The audience chamber in the Palace has also many very good features, among them being a finely

carved and inlaid wood door and frescos by Salviati in imitation of gold mosaic.

The presence in these apartments of the familiar characters of history surrounds them with an interest that it is pleasant to study, the names of Savonarola, the Medicis, Lorenzo the Magnificent and Cosmo the Great, are enrolled upon the list that have dwelt within these walls, and added to the glory of their country.

WOOD CARVING.

THE tendency of wood-carvers now-a-days is, unfortunately, to limit their efforts to the designs or forms that have prevailed for years, and flowers, leaves, fruit and the like are about the only style of ornamentation to be met; and even these are of the class of botany that recommended itself to our ancestors and has been accepted, unquestioned, ever since.

This condition of things is the more remarkable, inasmuch as the facilities for introducing a change are unlimited, and a visit of observation to the country will open a field of possibilities which the present carver seems to ignore.

There possibly may be no reasonable objection found to the use of the plants that have, in a measure, become standard, other than the lack of spirit which must necessarily be the accompaniment of a mere copy. When these subjects were new there was the inspiration of novelty, and action and life could be thrown into the work; but now it has resolved itself into a mechanical and dead imitation of the original—a pear must lie in just such a position and a peach is always of the ripest and most rotund description; apples have their stems all in the same direction and the leaves are suited only to midsummer—none of the worm-eaten, mellowed effect of the Autumn.

It may be that wood-carvers are not instructed to select the plants or foliage best adapted to carving. It is not natural for wood to be beautifully rounded, curved, softened and weakened; hence, why give us pomegranates, and cherries, and peaches? Is it not much better to have some clearly-defined object—sharp-cut edges? The proper selection of these objects is one of the requisites of successful carving, and may require as much study and consideration as the more artistic part of the work.

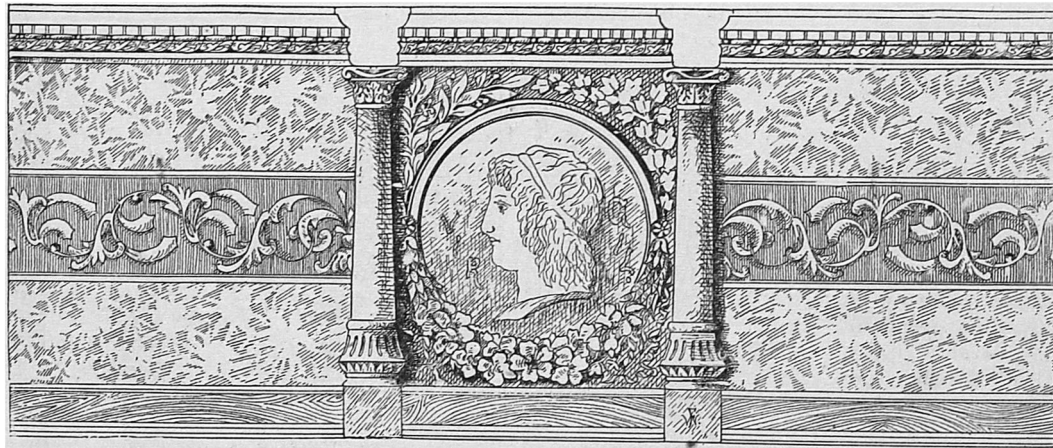
There is no reason why, in obtaining an all-over effect, the same flower should be repeated and duplicated; leave that to oil-cloth and wall-paper, where, to a considerable extent, it is unavoidable, and secure the same result, with much pleasanter effect, by using a variety of forms embracing sprigs, leaves, branches, buds, flowers with long, sharp petals, let them be flattened out, conventionalized—done anything with so long as they present varieties and evince at least a disposition to change and improve present models. Mr. LUTHER HOOPER suggests the chrysanthemum as an excellent flower for decorative treatment in wood-carving, and he says “many pleasing combinations may be made from it, suitable for inlaying in different colored woods or single, incised work.”

There should be one rule adopted in all carvings, which is, to have a plan, an object, a purpose shown in every work. Let fruit have a twig to sustain it and leaves grow from a branch or stem. There is really no beauty, when dissected, in the careless, ungraceful arrangement of fruits—such as meet us upon panels in many articles of furniture where carving is shown. It appears as though ornamentation of this kind is lavished upon all manner of furniture, regardless of its consistency, its artistic appearance, its truthfulness to nature, its suitability to the wood employed, or its application to the purposes for which it is used. These considerations are frequently the last to influence the

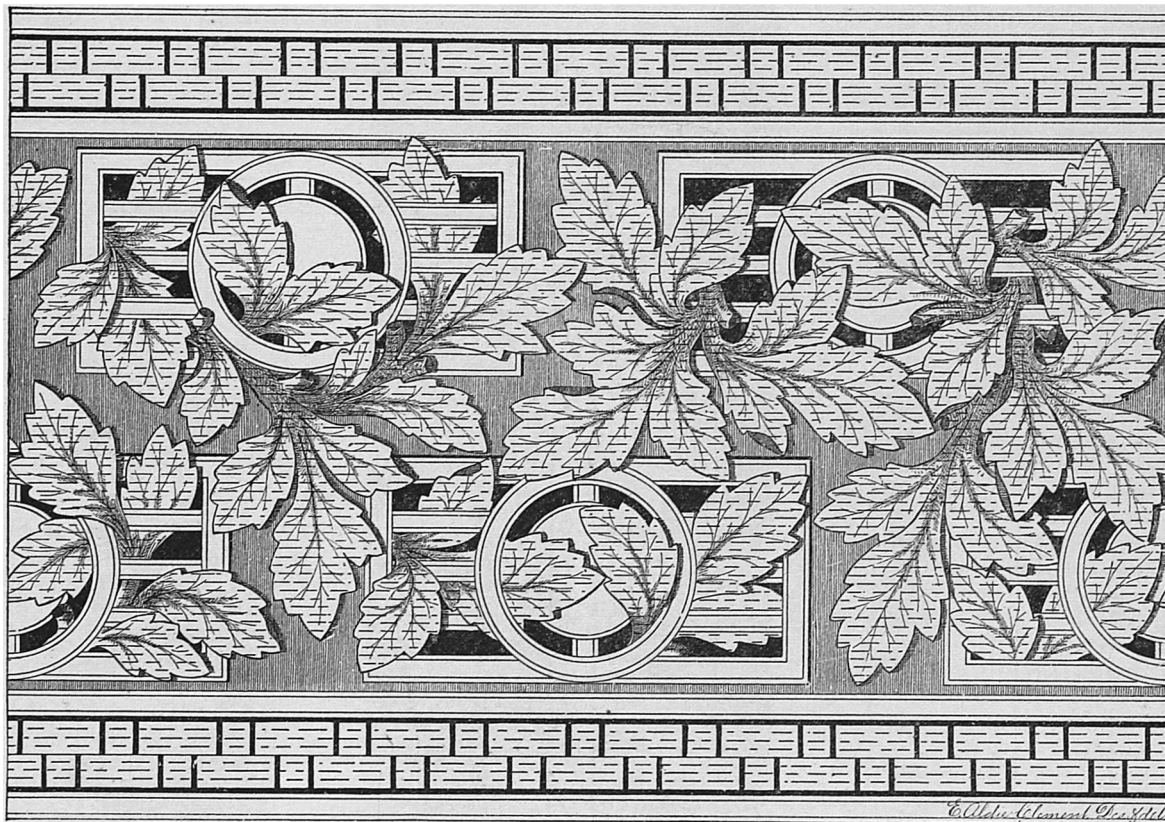
ideas of the artist, and he is as liable to put a bunch of grapes upon the arm of a chair, where it will be a constant source of annoyance to the occupant, as to place some other and less obtrusive ornament which would be in better accord with the comfort of anyone who might chance to sit within it, and more suggestive of the eternal fitness of things.

There is certainly no reason why various colored woods should not be used; let them be glued together as we are accustomed to see in the parti-colored wooden bowls and globes, so common among our ordinary utensils. A proper combination of prettily-colored woods would certainly be effective, and might lend an attraction and beauty to the carvings that would do much to detract one's attention from the ordinary patterns and designs that prevail.

A BORDER of daisies and cat tails is showy.



This frieze is to be used in a library where the finish is in mahogany, and from the top of the book-cases to the lower edge of the frieze should be solid paneling of wood. The work between the two pillars and surrounding the medallion is in carved mahogany, while the other panels are in stamped leather of two patterns and finish. The medallion is of metalized plaster, and, of course, the different squares contain different heads, Homer, Milton, etc. The position of the square panels must be determined by the architectural arrangement of the room.—F. H. WILLIAMS.



The ground of this design might be a medium shade of Pompeian red or terra cotta. The leaves in yellowish olive, shaded with one or two darker shades of the same color. The cross lines in gold. This will give life to the design, and take the place of flowers. The frames through which the leaves twine are steel blue, with background in green bronze. The background of the borders in steel blue. The blacks in the second shade of olive used, with the cross lines in dark seal brown. All the design to be outlined in dark seal brown. A broader style of shading might be used on the leaves with better effect.—E. ALDIE CLEMENT, E. Boston, Mass.

Why not encourage ladies to paint on rough tapestries such, for example, as the Gobelins and those which hang in the Louvre and Versailles?

Why not improve upon the transoms over doors for ventilation? The present swinging things are awkward, clumsy and provoking. We imagine something different would be acceptable to everybody.

Why not make electricity a study in our technical schools? There is every indication that this force will be the great motor for the world, and the sooner its capacities are understood, the better for the people generally.

THAT tireless gatherer of all sorts of news from the minutest to the most extensive, *The New York Herald*, finds much to interest the householder and the house-occupier; one of its practical items we clip:

“A NEW BATHING APPARATUS.—Given a room set apart for bathing purposes in every house and provided with cold and hot water, and it might seem that a contrivance to enjoy the bath in various ways would be invented. This might be expected more particularly in a climate like this, with its summer heats, making bathing as much a comfort and luxury as it is in the East, and with cold winters begetting bronchial and other troubles for which vapor and medicated baths are used. True, the number of public establishments for these purposes has increased, but no attempt seems to have been made to improve upon the simple tubs with faucets which were put into private houses after Croton was introduced.

A lad of sixteen, belonging to the Cooper Institute class

in mechanical drawing, has now fashioned a contrivance as ingenious as it is simple, and by means of which one can take at home in an ordinary bathroom, Russian, or spray, or vapor baths, or medicated baths of any kind. This young inventor's apparatus to secure spray or vapor is simply a metal pipe as big as one's finger running along one side of the tub at the top, and perforated with minute holes arranged to throw the spray upon the bather, the temperature of the water being regulated at will through the hot and cold water faucets. When hot water is shot through the hundreds of minute holes vapor either fills the room in a minute, or by means of a rubber cloth is confined to the tub, and the bather, seated, with his head free in the air, subjects his body to the action of the steam. To secure medicated baths, the boy has invented two little cups of peculiar pattern, which can be set upon a shelf and are connected with the metal spray pipe by means of rubber tubes. A tablespoonful of any liquid, from cologne water to carbolic acid, placed in one cup is minutely subdivided and permeates the vapor or spray in a few seconds. Solids like sulphur, or other medical substances, are placed in the other cup, which is of metal, and they are at once dissolved, and injected into spray or vapor in like manner.

“One apparatus has been manufactured and placed for trial in the French Hospital in this city, where it is being experimented with in the treatment of rheumatism and acute nervous diseases by spray baths permeated with drugs. The same contrivance being attached with rubber tubes to the faucets of a washbowl serves to produce vapor impregnated with chamomile or other herbs for inhalation in cases of bronchial affections. A number of physicians have called to see the young inventor, and all commend the invention, but express surprise that something of the kind was not produced long ago.”

AN article by Mr. O. B. Frothingham upon the art tendencies of the times is an interesting feature of the current number of *The Atlantic Monthly*. It is entitled

“ART AND WEALTH,”

And says concerning American art:

“When the country was small, fifty years ago, the air was bright with anticipations of grandeur, refinement, intellectual expansion, social improvement and reform. Now such anticipations are distant and faint. The task of developing the material resources of the country, of maintaining order, of getting possession of foreign markets, of educating or absorbing populations, engrosses attention to the exclusion of higher concerns. So far as one can see, the ideal period of American life is in the past. The civil war called forth heroism, but did not awaken poetry or art; and such a convulsion furnished an occasion the like of which may not recur. Industrial enterprise has since then taken a prodigious stride forward, and “material interests” overbear all others. Artistic creation is discouraged. A race for success seizes on all men, and success, as Rachel said, means money.”